

Practice Packet

#2

Polynomial & Rational
Functions

2.1-2.6 | See previous study guide and test

2.7 \div 2.8

Simplify the following rational expressions.

1. $\frac{x^2+4x-21}{x^2-9x+18}$

2. $\frac{\frac{x^2+7x}{3x}}{\frac{49-x^2}{3x-21}}$

3. $\frac{(a+b)\left(\frac{1}{a}-\frac{1}{b}\right)}{(a-b)\left(\frac{1}{a}+\frac{1}{b}\right)}$

4. $\frac{\left(\frac{p}{p-4}-\frac{1}{4}\right)}{\left(\frac{9}{4p}+\frac{p^2}{p-4}\right)}$

5.

$\frac{2x}{x-1} + \frac{1}{x-3} = \frac{2}{x^2-4x+3}$

6.

$\frac{x-3}{x} + \frac{3}{x+2} + \frac{6}{x^2+2x} = 0$

2.9

Find the important pieces and graph (VA/Holes, HA/Slant, all intercepts, domain).

1. $f(x) = -\frac{3}{x-1}$

2. $g(x) = \frac{5-2x}{x+4}$

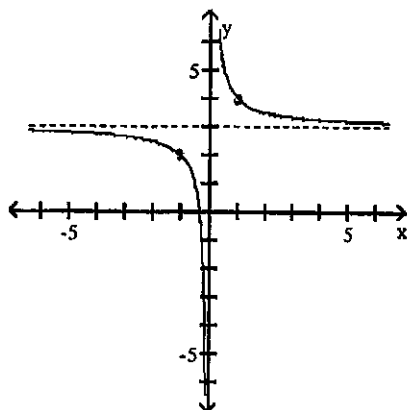
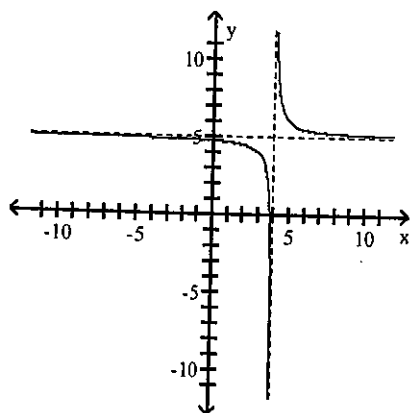
3. $h(x) = \frac{2x^2-2}{x^2-4}$

4. $i(x) = \frac{x^3}{x^2-9}$

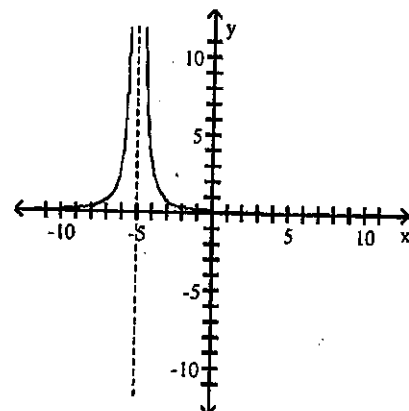
5. $j(x) = \frac{x^2-16}{x+4}$

2.10 Write a possible function (factored form) for each graph.

2.



3.



Analyze the following rational function.

$$y = \frac{2x^3 - 11x^2 - 10x + 75}{x^2 - x - 6}$$

Sketch a graph

V. A.

H.A.:

S.A.:

Holes.

Domain:

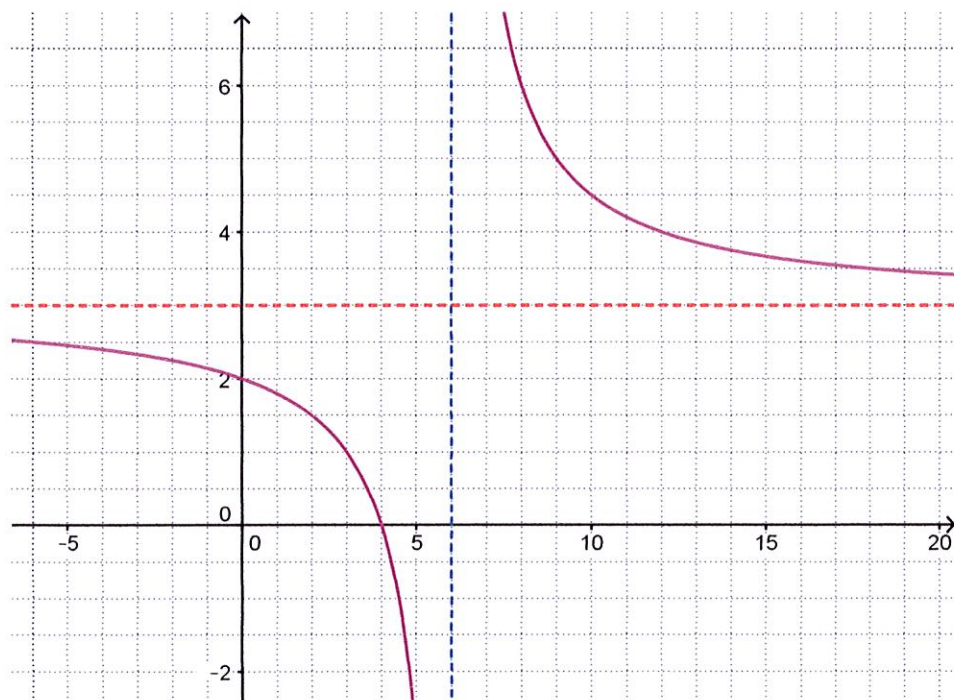
X. i.

y.i.:

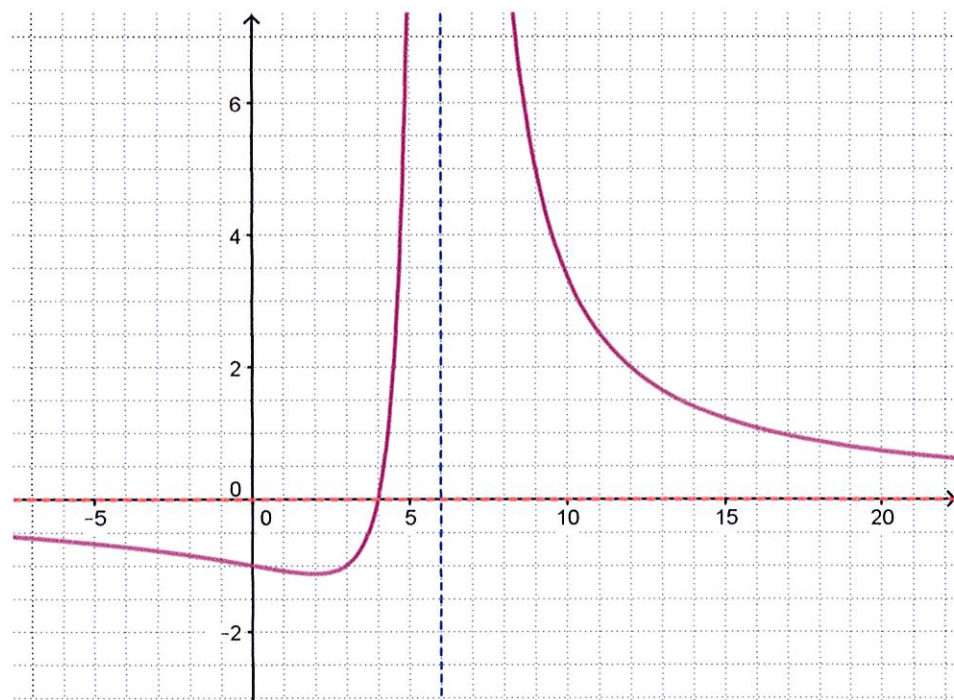
x	$f(x)$

2.10 Classwork

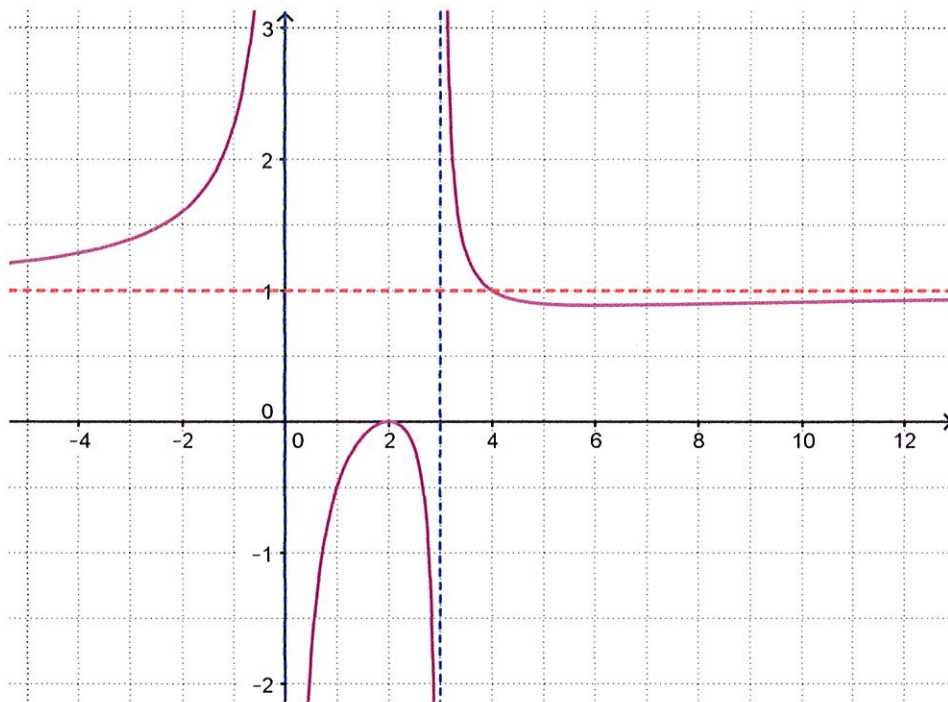
13.



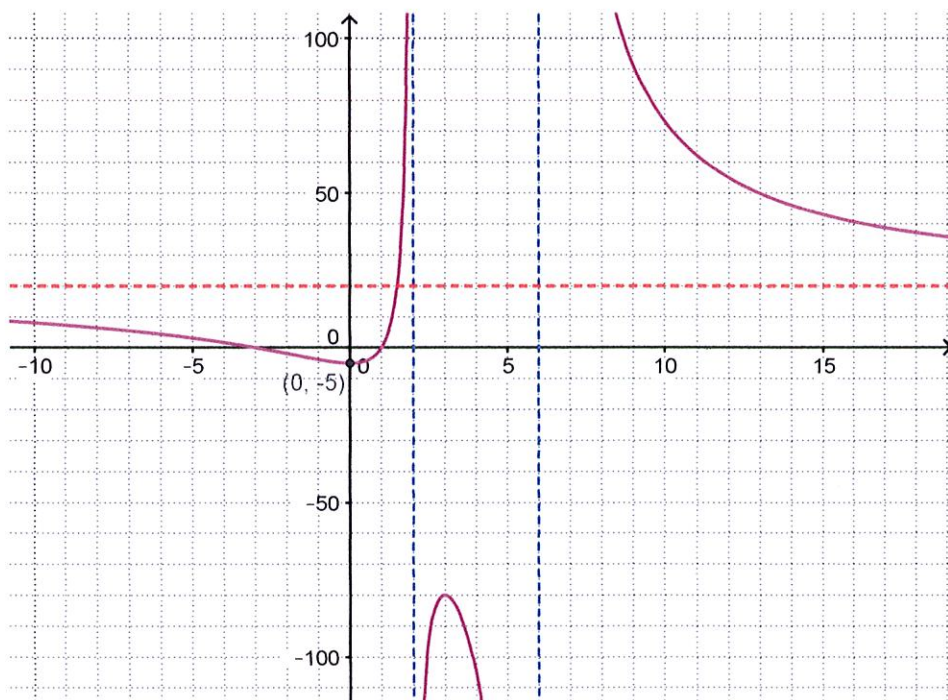
24.



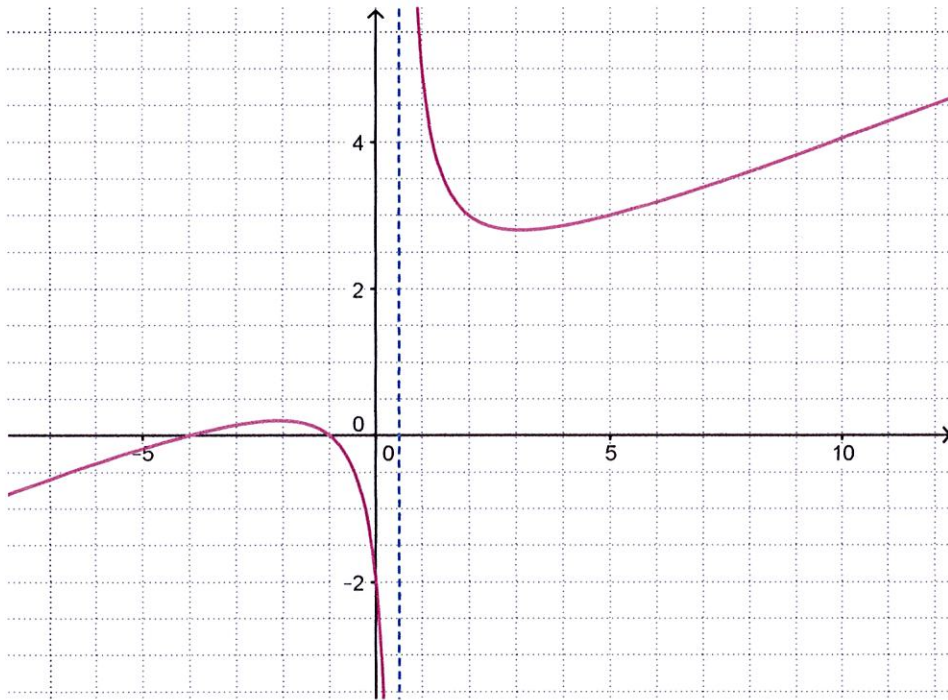
3x



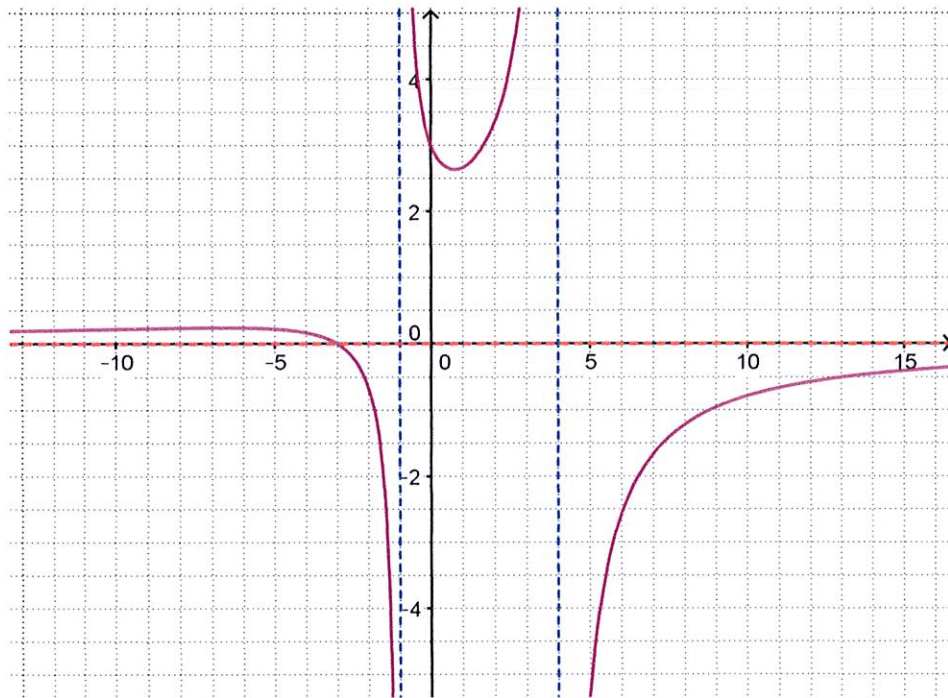
4x



Extra Challenge
5/6



6
x



Analyze the following rational function.

$$y = \frac{2x^3 - 11x^2 - 10x + 75}{x^2 - x - 6}$$

$$\frac{(x-3)(x-5)(2x+5)}{(x+3)(x+2)}$$

Sketch a graph

V.A.: $x = -2$

H.A.: DNE

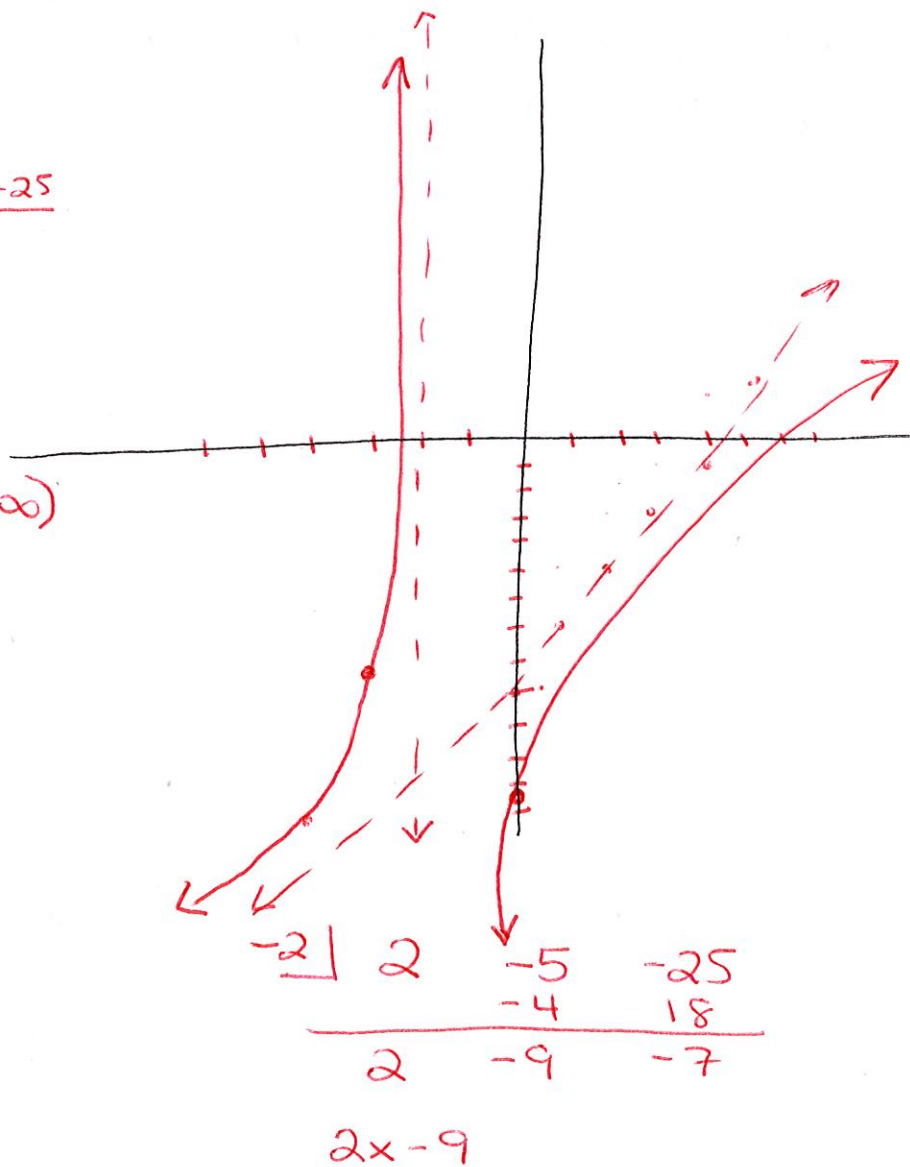
S.A.: $y = 2x - 9$ $\frac{2x^2 - 5x - 25}{x+2}$

Holes: $x = 3$

Domain: $(-\infty, -2)(-2, 3)(3, \infty)$

X.I.: 5 and $-\frac{5}{2}$

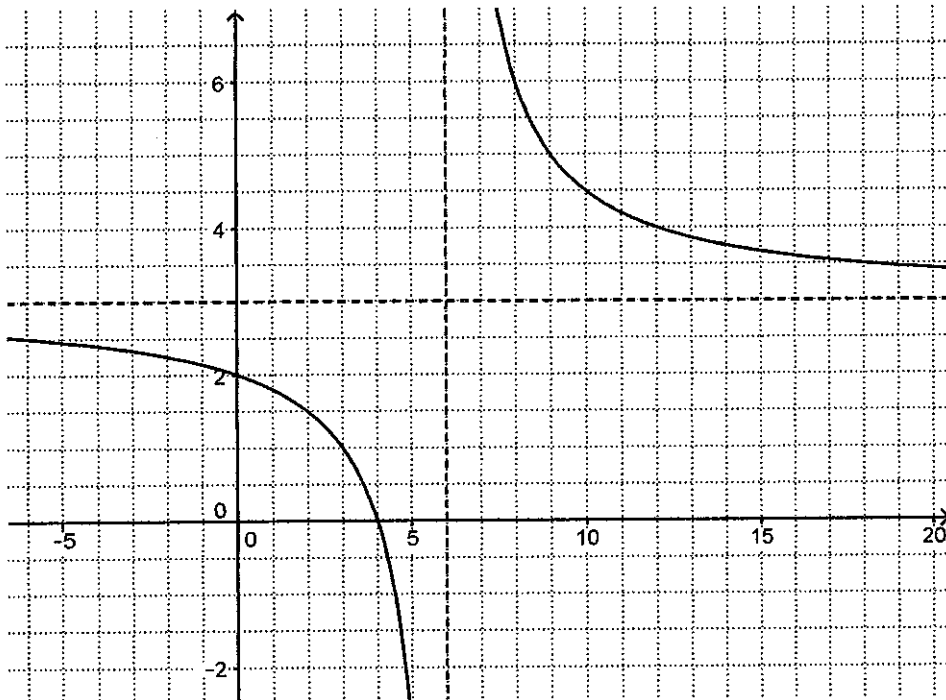
Y.I.: $\frac{(-5)(5)}{2} = -12\frac{1}{2}$



x	$f(x)$
-3	$\frac{8}{-1} = -8$
-4	$\frac{27}{-2} = -13.5$
3	
4	

Key

1X



x-int: 4

y-int: 2

asymptotes

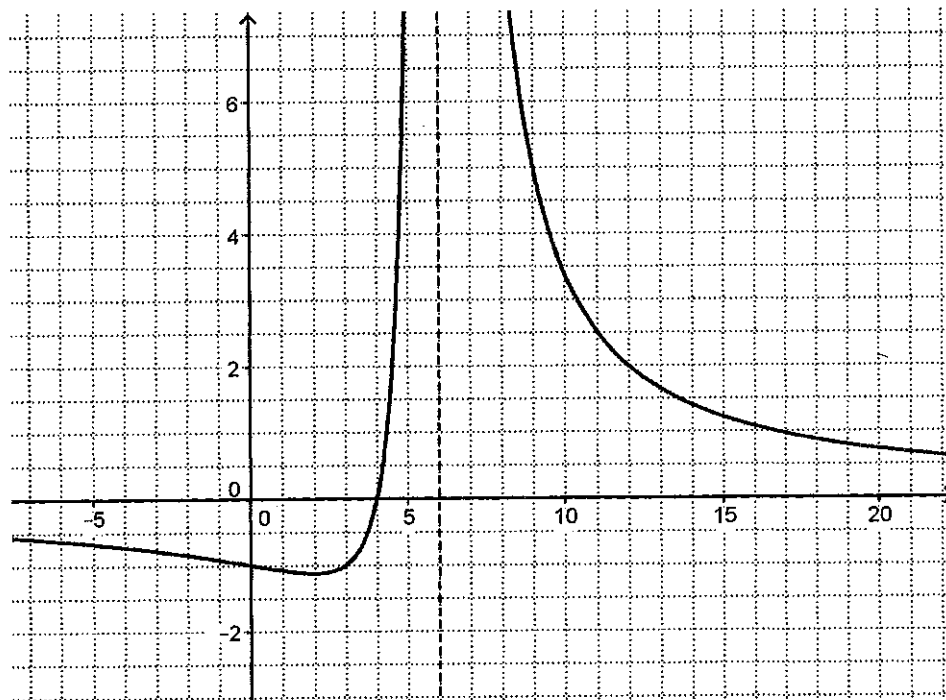
$x = 6$

$y = 3$

as $x \rightarrow \pm \infty$, $y \rightarrow 3$

$$y = \frac{3(x-4)}{x-6}$$

2X



x-int: 4

y-int: -1

asymptotes

$y = 0$

$x = 6$

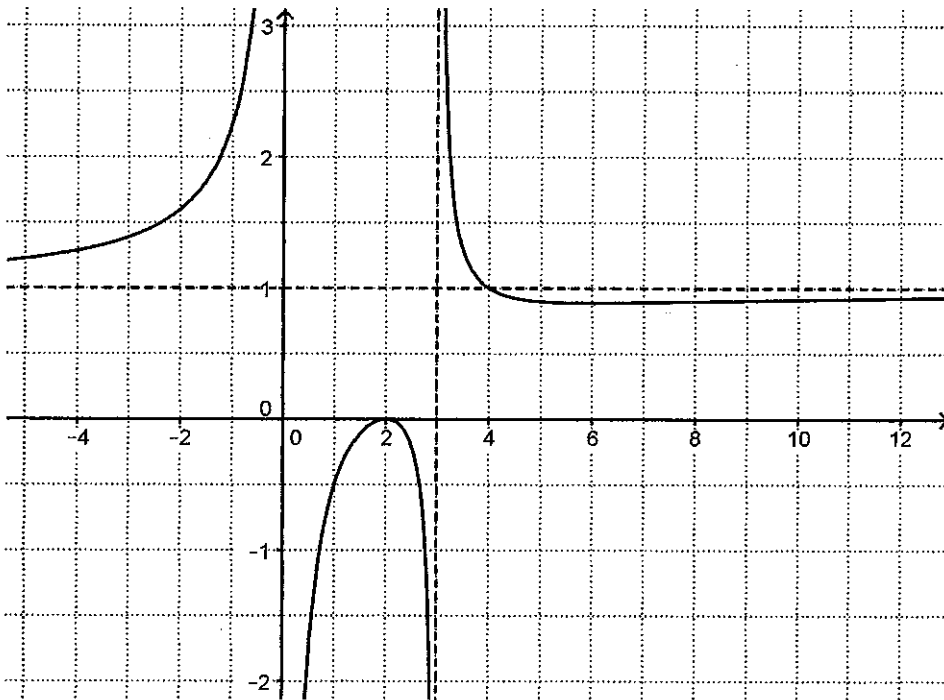
$$y = \frac{a(x-4)}{(x-6)^2}$$

$$-1 = \frac{a(-4)}{36}$$

$$a = 9$$

$$y = \frac{9(x-4)}{(x-6)^2}$$

3x



$$x\text{-int: } 2$$

$$y\text{-int: none}$$

asymptotes:

$$x=3, x=0$$

$$y=1$$

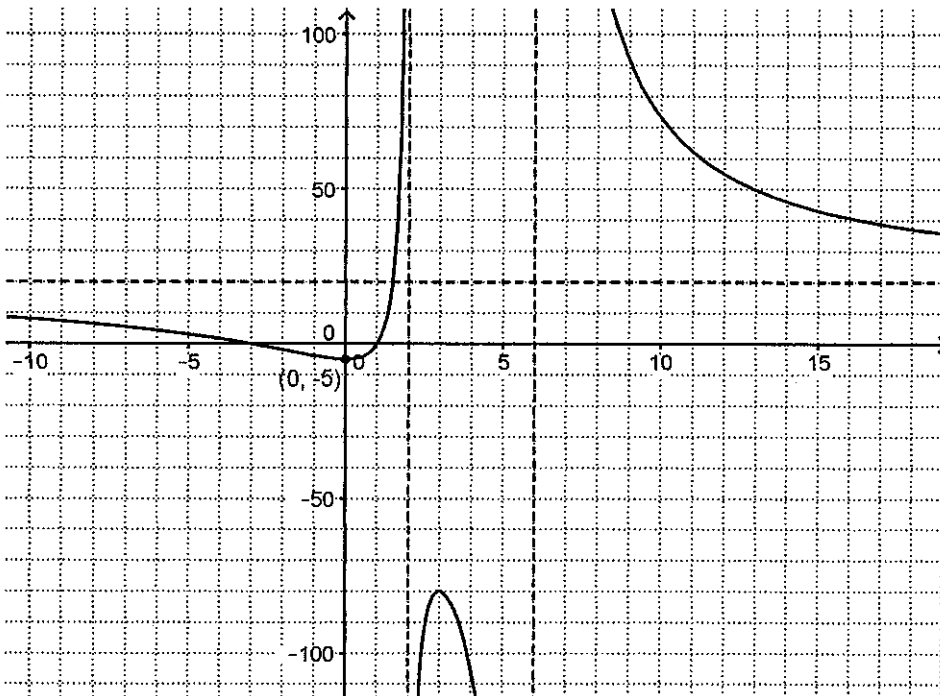
$$y = \frac{a(x-2)^2}{x(x-3)}$$

$$-\frac{1}{2} = \frac{a(1-2)^2}{1(1-3)}$$

$$-\frac{1}{2} = \frac{a}{-2} \Rightarrow a=1$$

$$y = \frac{(x-2)^2}{x(x-3)}$$

4x



$$x\text{-int: } 1, -3$$

$$y\text{-int: } -5$$

asymptotes:

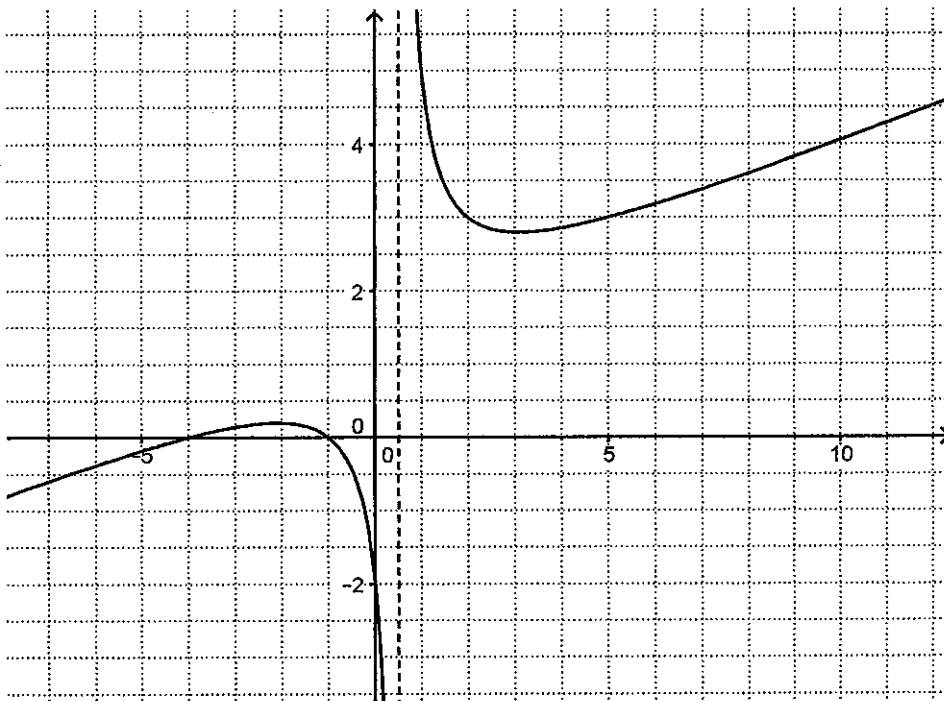
$$x=2, x=6$$

$$y=20$$

$$y = \frac{a(x-1)(x+3)}{(x-2)(x-6)}$$

$$y = \frac{20(x-1)(x+3)}{(x-2)(x-6)}$$

5x



$$x\text{-int: } -1, -4$$

$$y\text{-int: } -2$$

asymptotes:

$$x = \frac{1}{2}$$

(plus a slant asymptote)

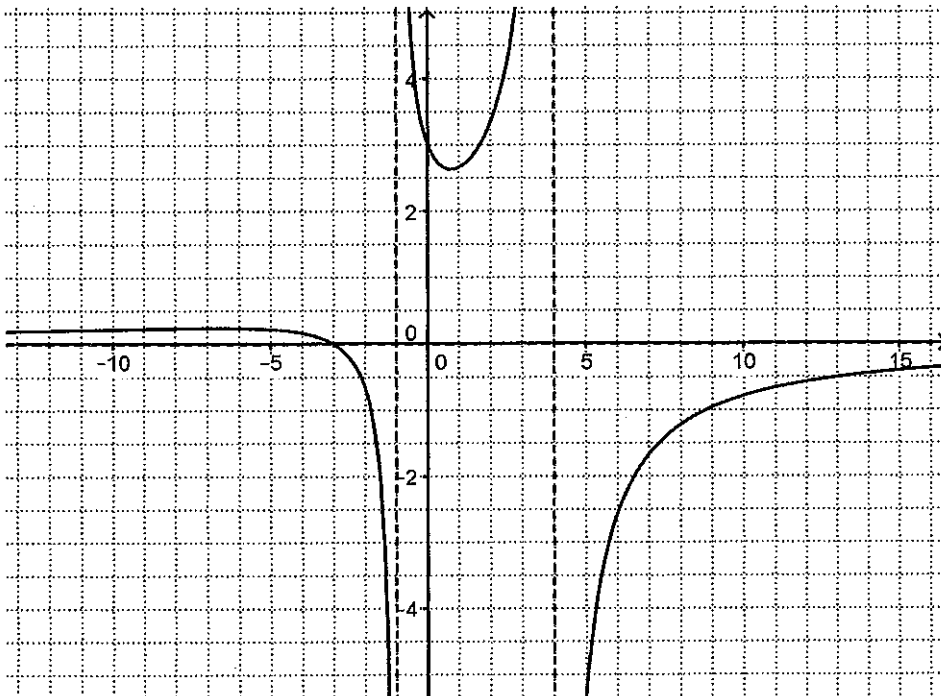
$$y = \frac{a(x+1)(x+4)}{2x-1}$$

$$-2 = \frac{a \cdot 4}{-1}$$

$$a = \frac{1}{2}$$

$$y = \frac{(x+1)(x+4)}{4x-2}$$

6x



$$x\text{-int: } -3$$

$$y\text{-int: } 3$$

asymptotes:

$$x = -1$$

$$x = 4$$

$$y = 0$$

$$y = \frac{a(x+3)}{(x+1)(x+4)}$$

$$3 = \frac{a \cdot 3}{4}$$

$$a = 4$$

$$y = \frac{-4(x+3)}{(x+1)(x+4)}$$

2.7 & 2.8

1. $\frac{x+7}{x-6}$

2. $\frac{1}{x}$

3. -1

4. $\frac{(3p+4)p}{4p^3+9p-36}$

5. $x = -\frac{1}{2}$

6. no solution

3 is extraneous!

2.9

1. VA: $x=1$

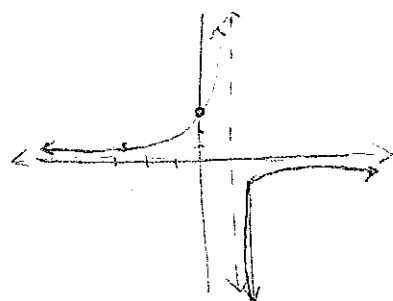
Holes: none

H.A: $y=0$

x.L: DNE

y.L: $(0, 3)$

D: $(-\infty, 1) \cup (1, \infty)$



2. VA $x=-4$

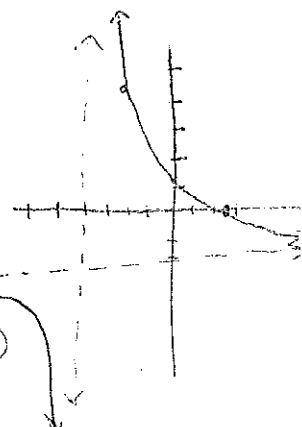
no holes

H.A: $y=-2$

x.L: $(\frac{5}{2}, 0)$

y.L: $(0, \frac{5}{4})$

$(-\infty, -4) \cup (-4, \infty)$



3. VA: $x=2, -2$

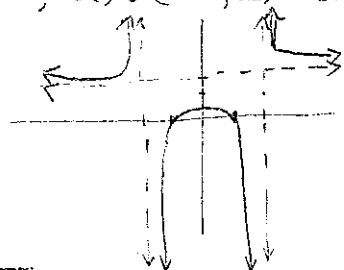
H.A: $y=2$

Holes: none

x.L: $(1, 0) (-1, 0)$

y.L: $(0, \frac{1}{2})$

D: $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$



4. VA: $x=3, x=-3$

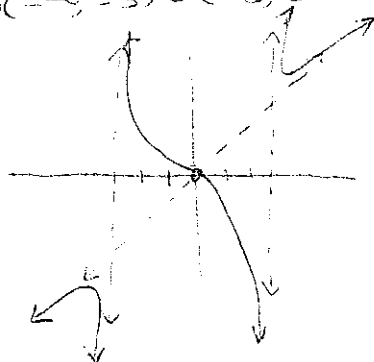
H.A: DNE SA: $y=x$

Holes: none

x.L: $(0, 0)$

y.L: $(0, 0)$

D: $(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$



5. $(x-4)=y$

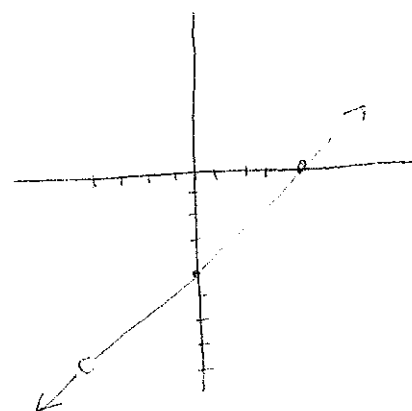
VA none

Hole @ $x=-4$

D: $(-\infty, -4) \cup (4, \infty)$

Int: $(0, -4)$

$(4, 0)$



2.10

A. $\frac{1}{x-4} + 5$

B. $\frac{1}{x} + 3$

C. $\frac{1}{(x+5)^2}$